

Compact high current DC EMC/EMI filter



- Reduces conducted emissions towards the solar panel
- Reduces the probability of EMI radiation off the solar panel
- Helps to prevent premature panel aging
- Helps to meet international EMC regulations
- Most compact standard solution in the industry
- FN2210 HV without Cy capacitors to ground



Performance indicators

Attenuation performance



Rated current [A]



Technical Specifications

| | |
|--|--|
| Maximum continuous operating voltage | 1'500 VDC |
| Operating frequency | DC |
| Rated currents | 250 to 2300 A @50°C |
| High potential test voltage | P -> E 6'800 VDC for 2 sec P -> P 3'850 VDC for 2 sec |
| Protection category | IP 00 |
| Overload capability | 4x rated current at switch on, max. 8 sec 1.5x rated current for 1 minute, once per hour -40°C |
| Temperature range (operation and storage) | to +100°C |
| Climatic category | 40/100/21 acc. to IEC 60068-1 |
| Terminals/Housing | Ni plated cu bars/Metal |
| Flammability corresponding to | UL 94V-0 |
| Design corresponding to | UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939, EN 60721-3, EN 62109 |
| MTBF @ Rated amb. Temp./Voltage (Mil-HB-217F) | > 200,000 hours |

Approvals & Compliances



The FN 2211 HV/FN 2210 HV series are the most compact dedicated high current DC filters for PV inverters in the industry and therefore are an optimum fit with most modern PV inverter generation. In addition the filters can be configured in a very flexible way to fulfil customized application requirements.

All FN 2211 HV/FN 2210 HV come in unsymmetrical housings, which help to prevent inverse installation and wrong electrical connection. Along with grid-side installed Schaffner AC EMC/EMI filters FN 3311 HV/FN 3310 HV, the DC filters FN 2211 HV/FN 2210 HV are key to meet the stringent international standards for electromagnetic compatibility and help to ensure a reliable and fault-free operation of the entire PV system.

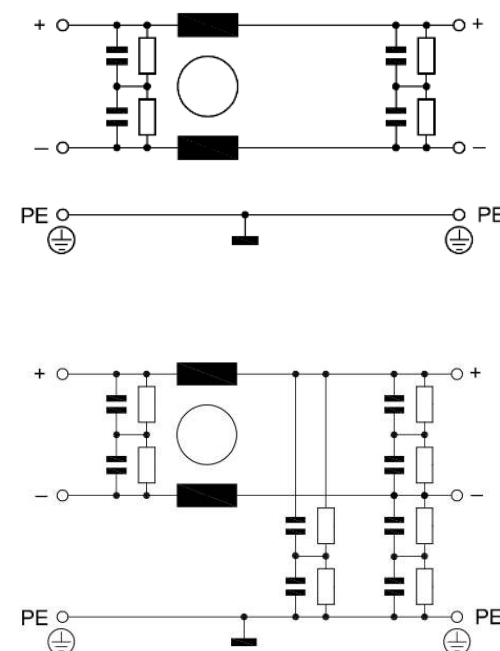
Features and Benefits

Installed between the PV inverter and the solar panel, the FN 2211 HV and FN 2210 HV DC filters are used to influence positively the conducted emissions on the panel side of the system. Therefore the DC filters significantly reduce the potential for highfrequency (HF) interference radiation of the panel. The filter also helps to prevent premature panel aging because of HF stray and leakage currents.

Typical Applications

The FN 2211 HV/FN 2210 HV series are primarily designed for PV inverter applications between 250 and 2'300 A. However, they can potentially also be applied in other DC applications within published specifications, like UPS, DC motor drives, energy/battery storage systems, or DC charger installations.

Typical electrical schematic



Filter Selection Table

| Filters * | Rated current @ 50°C [A] | Power loss @ 25°C/DC [W] | Weight [kg] |
|----------------------------------|--------------------------------|--------------------------------|----------------|
| FN 2211 HV with Cy caps | | | |
| FN 2211HV-250-99-C27-R99 | 250 | 9 | 3.3 |
| FN 2211 HV-400-99-C27-R99 | 400 | 14 | 4.2 |
| FN 2211 HV-600-99-C27-R99 | 600 | 15 | 4.8 |
| FN 2211 HV-1000-99-C27-R99 | 1000 | 31 | 7.1 |
| FN 2211 HV-1500-99-C27-R99 | 1500 | 41 | 12.4 |
| FN 2211 HV-2300-99-C27-R99 | 2300 | 64 | 18.3 |
| FN 2210 HVwithout Cy caps | | | |
| FN 2210 HV-250-99-R9 | 250 | 9 | 2. |
| FN 2210 HV-400-99-R9 | 400 | 14 | 3.3 |
| FN 2210 HV-600-99-R9 | 600 | 15 | 4.0 |
| FN 2210 HV-1000-99-R9 | 1000 | 31 | 6.4 |
| FN 2210 HV-1500-99-R9 | 1500 | 41 | 11.2 |
| FN 2210 HV-2300-99-R9 | 2300 | 64 | 17.6 |

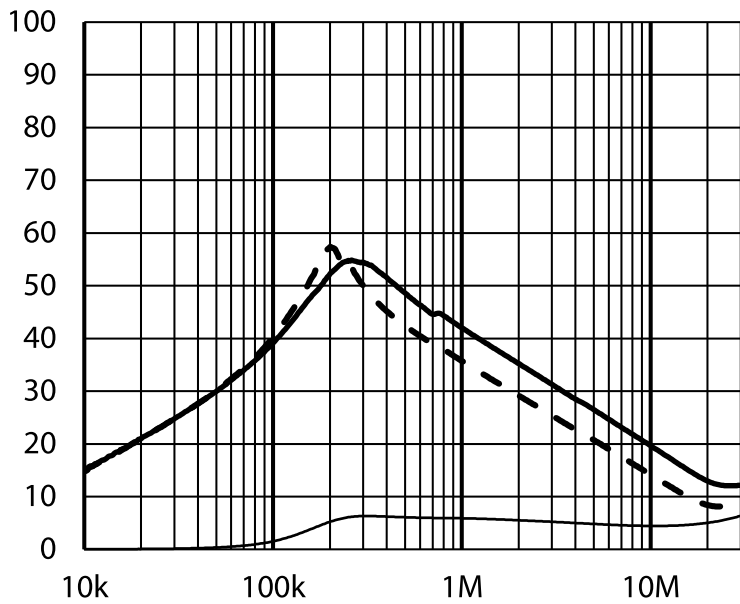
* Filters with reduced Cy capacitance to ground for high asymmetrical currents and higher voltages available upon request.

Typical Filter Attenuation FN 221x HV-xxx-99-C27-R99

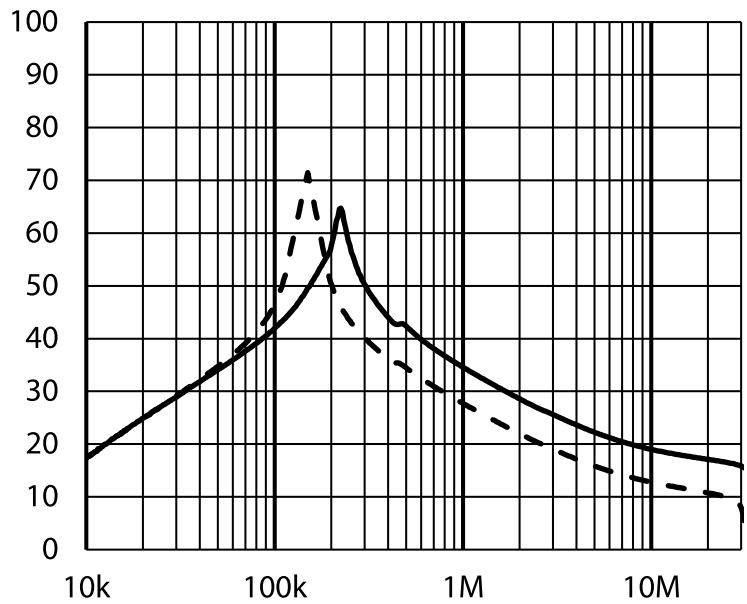
Per CISPR 17

50 / 50 Ω asym

50 / 50 Ω sym



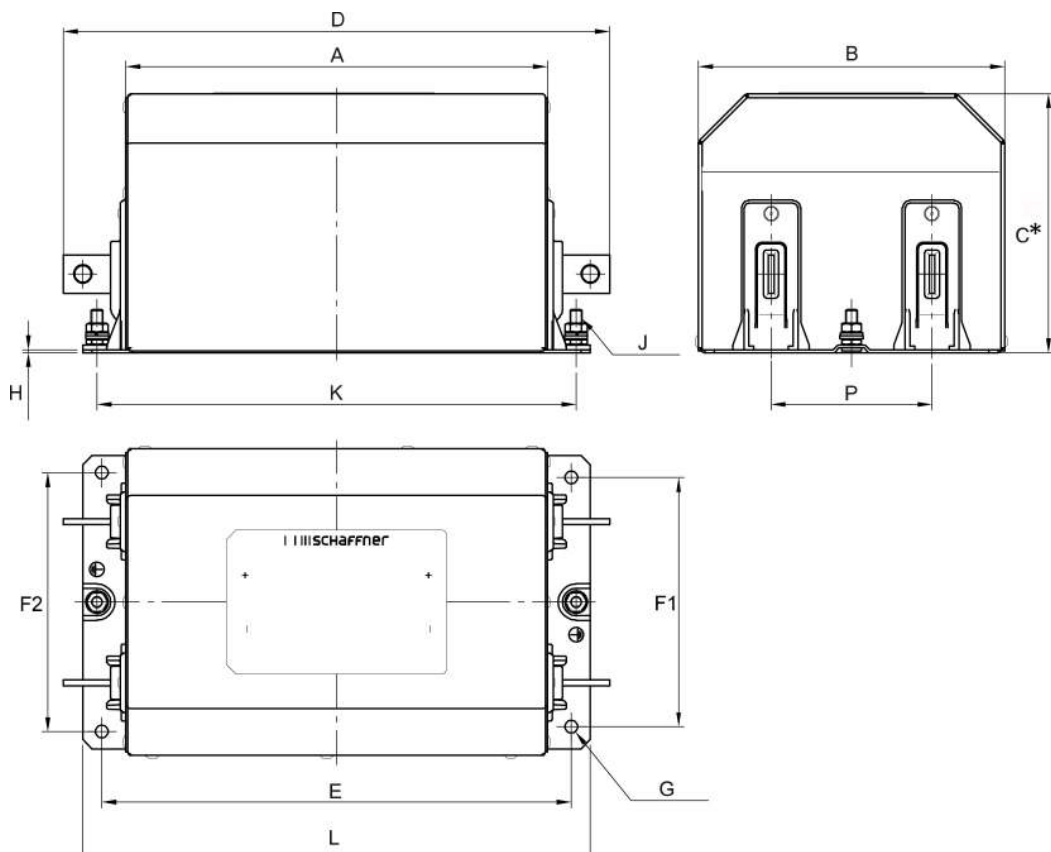
— FN 2211 HV (250 - 1000A)
 - - FN 2211 HV (1500 - 2300A)
 — FN 2210 HV



— FN 221X HV (250 - 1000A)
 - - FN 221X HV (1500 - 2300A)

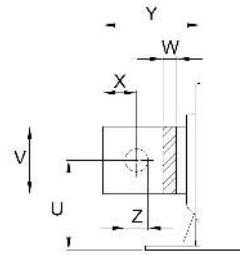
Mechanical Data

250 to 2'300 A types

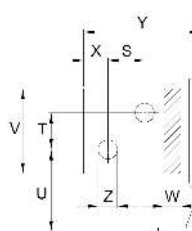


Busbar Connections

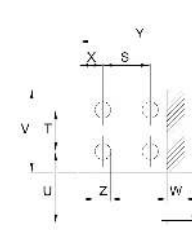
250 to 1'000 A types



1'500 A types



2'300 A types



Note: all FN 2211 and FN 2210 provide unsymmetrical mounting hole patterns to prevent inverse filter installation in the field.

Dimensions

| | FN 2211 HV 250 A | FN 2210 HV* 250 A | FN 2211 HV 400 A | FN 2210 HV* 400 A | FN 2211 HV 600 A | FN 2210 HV* 600 A | FN 2211 HV 1'000 A | FN 2210 HV* 1'000 A | FN 2211 HV 1'500 A | FN 2210 HV* 1'500 A | FN 2211 HV 2'300 A | FN 2210 HV* 2'300 A |
|-----------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|---------------------------|
| A | 220 | 205 | 235 | 215 | 240 | 225 | 265 | 265 | 275 | 275 | 305 | 305 |
| B | 160 | 145 | 175 | 160 | 175 | 170 | 180 | 180 | 215 | 215 | 230 | 230 |
| C* | 140 | 105 | 150 | 110 | 150 | 110 | 165 | 110 | 200 | 150 | 210 | 165 |
| D | 285 | 270 | 310 | 290 | 315 | 300 | 380 | 380 | 440 | 440 | 495 | 495 |
| E | 245 | 227 | 260 | 240 | 265 | 250 | 300 | 300 | 315 | 315 | 345 | 345 |
| F1 | 130 | 120 | 140 | 125 | 140 | 135 | 140 | 140 | 175 | 175 | 180 | 180 |
| F2 | 135 | 125 | 145 | 130 | 145 | 140 | 145 | 145 | 180 | 180 | 185 | 185 |
| G | Ø 7 | Ø 7 | Ø 9 | Ø 9 | Ø 9 | Ø 9 | Ø 11 | Ø 11 | Ø 11 | Ø 11 | Ø 11 | Ø 11 |
| H | 1.5 | 1.5 | 2 | 2 | 2 | 2 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| J | M6 | M6 | M8 | M8 | M8 | M8 | M8 | M8 | M10 | M10 | M10 | M10 |
| K | 250 (+/- 1) | 230 (+/- 1) | 265 (+/- 1) | 245 (+/- 1) | 270 (+/- 1) | 255 (+/- 1) | 310 (+/- 1) | 310 (+/- 1) | 321 (+/- 1) | 321 (+/- 1) | 351 (+/- 1) | 351 (+/- 1) |
| L | 265 | 245 | 285 | 265 | 290 | 275 | 330 | 330 | 345 | 345 | 375 | 375 |
| P | 84 (+/- 0.5) | 74 (+/- 0.5) | 86 (+/- 0.5) | 71 (+/- 0.5) | 84 (+/- 0.5) | 79 (+/- 0.5) | 86 (+/- 0.5) | 86 (+/- 0.5) | 86 (+/- 0.5) | 86 (+/- 0.5) | 93 (+/- 0.5) | 93 (+/- 0.5) |
| S | | | | | | | | | 26 | 26 | 40 | 40 |
| T | | | | | | | | | 26 | 26 | 35 | 35 |
| U | 41 | 41 | 46 | 46 | 49.5 | 49.5 | 53 | 53 | 58 | 58 | 60.5 | 60.5 |
| V | 20 | 20 | 25 | 25 | 25 | 25 | 40 | 40 | 60 | 60 | 70 | 70 |
| W | 3 | 3 | 4 | 4 | 8 | 8 | 8 | 8 | 10 | 10 | 15 | 15 |
| X | 10 | 10 | 12.5 | 12.5 | 12.5 | 12.5 | 20 | 20 | 17 | 17 | 20 | 20 |
| Y | 32.5 | 32.5 | 37.5 | 37.5 | 37.5 | 37.5 | 57.5 | 57.5 | 82.5 | 82.5 | 82.5 | 95 |
| Z | Ø 9 | Ø 9 | Ø 11 | Ø 11 | Ø 11 | Ø 11 | Ø 13.5 | Ø 13.5 | Ø 13.5 | Ø 13.5 | Ø 13.5 | Ø 13.5 |

* Filters with flat top (Dimension C)
 All dimensions in mm; 1 inch=25.4mm
 Tolerances according: ISO 2768-m / EN 22768-m, if not stated otherwise

Please see the brochure "Basics in EMC and Power Quality" on our website www.schaffner.com/downloads to find more details on filter connectors.

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